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10/611,818	06/30/2003	Makaram Raghunandan	42P16525	3019

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EXAMINER

HUSSAIN, TAUQIR

ART UNIT	PAPER NUMBER
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2152

MAIL DATE	DELIVERY MODE
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10/11/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No.	Applicant(s)	
	10/611,818	RAGHUNANDAN, MAKARAM	
	Examiner	Art Unit	
	Tauqir Hussain	2152	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 July 2007.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration:
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-40 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This office action is in response to amendment /reconsideration filed on 07/23/2007, the amendment/reconsideration has been considered. Claims 1, 5 and 27 have been amended accordingly for cited reasons in prior office action. Claims 1-40 are pending for examination, the rejection cited as stated below.
2. Jennings and Baskins have been cited as prior arts in the last office action. The teachings that applicable are respectfully maintained and incorporated by reference as set forth in the last office action.
3. Applicant's amendment have been fully considered but deemed not persuasive. Prior office action rejection is maintained and presented in this Office action.

Response to Arguments

4. Claim rejections under 35 U.S.C 101 are withdrawn after applicant's amendment to the specification as per fulfilling 35 U.S.C 101 requirements.
5. Claim rejection under 35 U.S.C 112 second is withdrawn as applicants amendment overcome the prior rejection.
6. Applicant argues to the limitations of independent claims 1, 28 and 35 as follows:
 - a. Jennings does not disclose a pruned trie entry as recited in the claims.
 - b. Jennings does not disclose, whether the trie entry portion matches the second portion of the address and whether a trie entry of a second trie block indicates a location of a next hop address, wherein the trie entry of the second

trie block is identified by a second portion of the prefix matching a third portion of the address.

c. Baskins does not provide positional information about the stored data relative to other portions of data.

As to applicant's argument (a), Examiner further elaborates the disclosure of pruned trie entry in cited art of Jennings. Abstract of Jennings discloses that memory is divided into different sizes and each block consisting of a multiplicity of locations, further a shift register holds a network address representing the destination of a packet. For argument sake if we look at Fig.4, there are three levels of trie and since register shift the key to the left by the number of bits previously used so that successive numbers of bits identifying a route to the destination which means register has access to all three trie levels and all three of these trie levels have pointer or redirection information therefore, any of these three trie can be used for pruned-trie entry.

As to applicant's argument (b), Examiner likes to mention that Jennings implicitly discloses the limitation "whether a trie entry of a second trie block indicates a location of a next hop address" (Jennings, Fig.3, and Element-47, where next block pointer could be next hop address). Baskins discloses the limitation, "the trie entry portion matches the second portion of the address", (Baskins, [0021], where lookup process between insertion and modification of data stored in the data structure requires a matching of information). The limitation "wherein the trie entry of the second trie block is identified by a second portion of the prefix matching a third portion of the address" is merely a pointer located in each trie for the next block address which is disclosed by both

Jennings, Abstract and Baskins [0022], where pointers are located at multiple locations to provide address for next block.

As to applicant's argument (c), Examiner cites (Baskins, [0012], where tree and subtree (a hierarchical structure) of ordered elements is disclosed along with their relative locations.

Any remark, which is not in the claimed language, is not being considered by Examiner.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the amended claim limitations of claim 27 e.g. "matching the second portion of the address" and "the different trie entry of the second trie block is identified by a third portion of the prefix matching the second portion of the address", must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-40, are rejected under 35 U.S.C. 103(a) as being unpatentable over Jennings et al. (GB 2350534 A), hereinafter "Jennings" in view of Baskins et al. (Patent No.: EP 1265161 A2), hereinafter "Baskins".

8. As to claims 1, 28 and 35, Jennings discloses the invention substantially, including, identifying data to be added to a trie (Jennings, page.3, lines 18-19), separating the data into portions having sizes based, at least in part, on sizes related to trie blocks in the trie (Jennings, page.3, lines 19-21, where blocks are trie blocks with in a block of memory), indicating in a trie entry of a first trie block, wherein a first portion of the data identifies the trie entry, that a second portion of the data is stored in a pruned-trie entry (Jennings, Fig.2, Element-21, page.3, lines 22-23, where header information is in the first block and has a pointer for another block which indicates the size of that block , pointer could be the pruned-trie entry).

Jennings is silent on storing the second portion of the data in the pruned-trie entry and indicating in the pruned-trie entry the position the second portion of the data occupies relative to other portions of the data. However, Baskins discloses, storing the second portion of the data in the pruned-trie entry (Baskins, [0022, lines 1-8, where accessing the data structure means that information is stored as explained above in the second portion of the header e.g. a pointer is a pruned-trie entry) and indicating in the pruned-trie entry the position the second portion of the data occupies relative to other portions of the data (Baskins, [0022, lines 8-13]).

Therefore, it would have been obvious to one ordinary skilled in the art at the time the invention was made to combine the teachings of Jennings with the teachings of Baskins in order to provide an adaptive digital tree data structure to incorporate a rich pointer object, including both conventional address redirection information used to

traverse the structure and supplementary information used to optimize tree traversal, skip levels, detect errors and store state information.

9. As to claims 16, 32 and 38, Jennings and Baskins discloses the invention substantially, including, identifying in a data packet an address of a network device (Jennings, page.1, lines 16-17, where destination address is a network address);

locating, in a first trie block of a trie data structure, a first portion of a prefix that matches a corresponding first portion of the address, wherein the first portion of the prefix identifies a trie entry of a first trie block (Jennings, page.2, lines 16-22, where data base is divided into two parts and pointer result field identifies the trie entry of a first trie block);

determining whether the trie entry of the first trie block indicates that a trie-entry portion of the prefix is stored in a pruned-trie entry (Jennings, page.2, lines 16-22, where data base is divided into two parts and second part of the database contain the pruned-trie entry e.g. pointer related information for the next block)

if the first trie entry indicates that the trie-entry portion of the prefix is stored in the pruned-trie entry (Jennings, page.2, lines 16-22, where result field determines whether there is an entry for a trie block):

determining from the trie entry of the first trie block a location of the pruned-trie entry (Jennings, page.2, lines 21-22);

determining whether the trie-entry portion of the prefix matches a second portion of the address that occupies the same position in the address as the trie-entry portion occupies in the prefix (Jennings, page.2, lines 22-23, where, if it is determined that the

packets may have the same next hop than there will be a match of fields in the trie block).

Jennings is silent on if the trie-entry portion matches the second portion of the address, whether a trie entry of a second trie block indicates a location of a next hop address, wherein the trie entry of the second trie block is identified by a second portion of the prefix matching a third portion of the address. However, Baskins discloses, on if the trie-entry portion matches the second portion of the address, whether a trie entry of a second trie block indicates a location of a next hop address, wherein the trie entry of the second trie block is identified by a second portion of the prefix matching a third portion of the address (Baskins, [0022, lines 10-18], where, pointer information contains the address of the next level, this pointer information could be the third portion of data which has the information of the next level/block, where as this third portion is still residing in the second trie block); and determining the next hop address from the trie entry of the second trie block, if the trie entry of the second trie block indicates the location of the next hop address (Baskins, [0022, lines 1-6, where redirection pointer is the next hop address).

10. As to claims 2, 29 and 36, Jennings and Baskins discloses the invention substantially as in parent claims 1, 28 and 35, including, indicating in the trie entry of the first trie block a location of a second trie block Baskins, [0022, lines 1-6], where header information belongs to the first block which also contain the pointer, pointing to the next level); and

indicating, in a trie entry of the second trie block, a location of additional data associated with the data, wherein a third portion of the data identifies the trie entry in the second trie block (Baskins, [0022, lines 10-18], where, pointer information contains the address of the next level, this pointer information could be the third portion of data which has the information of the next level/block, where as this third portion is still residing in the second trie block).

11. As to claim 3, Jennings and Baskins discloses the invention substantially as in parent claim 1, including, wherein the pruned-trie entry is located in the first trie block (Jennings, Fig.2, Element-21, Page.5, line 31 and page.6, line 1, where header is a first block and header information is separated into MAC address and destination address and they both exist in the same block, further destination address could be a pruned-trie entry located in the first block).

12. As to claim 4, Jennings and Baskins discloses the invention substantially as in parent claim 1, including, wherein indicating that the second portion of the data is stored in the pruned-trie entry of the first trie block comprises storing the second portion in the trie entry of the first trie block (Jennings, page.4, lines 3-8, where pruned-trie entry for the second block is residing in the first trie block).

13. As to claim 5, Jennings and Baskins discloses the invention substantially as in parent claim 1, including, wherein the pruned-trie entry is located in the second trie block (Baskins, [0022, lines 10-18], where, pointer information contains the address of the next level, this pointer information could be the third portion of data which has the

information of the next level/block, where as this third portion is still residing in the second trie block).

14. As to claim 6, Jennings and Baskins discloses the invention substantially as in parent claim 5, including, wherein indicating that the second portion is stored in the pruned-trie entry comprises setting a bit to indicate that the second portion is stored in the pruned-trie entry (Jennings, page.4, lines 10-12, where all the pointers which are pruned-trie entry are in number of bits).

15. As to claim 7, Jennings and Baskins discloses the invention substantially as in parent claim 5, including, wherein indicating that the second portion is stored in the pruned-trie entry comprises setting a pointer to point to the pruned-trie entry (Jennings, page.4, lines 10-14).

16. As to claims 8, 30 and 37, Jennings and Baskins discloses the invention substantially as in parent claims 2, 28 and 35, including, wherein the data comprises a prefix (Jennings, Fig.2, Element-21, where header is prefix).

17. As to claims 9 and 31, Jennings and Baskins discloses the invention substantially as in parent claims 8 and 28, including, wherein the additional data comprises a next hop address (Jennings, page.2, lines 10-14, where next router address is next hop).

18. As to claim 10, Jennings and Baskins disclose the invention substantially as in parent claim 1, including, wherein the sizes related to the trie block comprise the sizes of the first trie block, the second trie block and the pruned-trie entry (Jennings, page.4,

lines 3-8, where first block contains the first trie block entry key, pointer, the second trie block and a result field, a pruned-trie entry).

19. As to claim 11, Jennings and Baskins disclose the invention substantially as in parent claim 1, including, wherein the first portion comprises a root portion and the second portion comprises one or more portions following the root portion (As explained in claim 1, header information is the first thing analyzed in the communication device and pruned-trie has the information related to the second block, therefore first portion has to comprise of root portion which is the first trie-block, Jennings, Fig.2, Element-21, page.3, lines 22-23, where header information is in the first block and has a pointer for another block which indicates the size of that block , pointer could be the pruned-trie entry).

20. As to claim 12, Jennings and Baskins disclose the invention substantially as in parent claim 1, including, wherein the first portion comprises a non-root portion and the second portion comprises one or more portions following the non-root portion (Jennings, page.2, lines 20-21, where result field not being set means first portion is a non-root portion).

21. As to claim 13, Jennings and Baskins disclose the invention substantially as in parent claim 1, including, wherein indicating the position of the second portion comprises adding to the pruned-trie entry an indication of the position of the second portion (Baskins, [0022, lines 13-17, where next level pointer's "point" will be the position of the second portion).

22. As to claim 14, Jennings and Baskins disclose the invention substantially as in parent claim 13, including, wherein the indication of the position comprises a range of bit positions (Baskins, [0022, lines 13-17, where population counts can be interpret as bit positions).

23. As to claim 15, Jennings and Baskins disclose the invention substantially as in parent claim 13, including, wherein the indication of the position comprises a mask that indicates bit positions (Baskins, [0022, lines 13-17, where index digits can be interpret as mask).

24. As to claims 17, 33 and 39, Jennings and Baskins disclose the invention substantially as in parent claims 16, 32 and 38, including, wherein the address comprises a destination address (Jennings, page.2, lines 13-14, where address data for forwarding packets to the next destination is the destination address).

25. As to claim 18, Jennings and Baskins disclose the invention substantially as in parent claim 16, including, wherein the pruned-trie entry is located in the first trie block (Jennings, Fig.2, Element-21, Page.5, line 31 and page.6, line 1, where header is a first block and header information is separated into MAC address and destination address and they both exist in the same block, further destination address could be a pruned-trie entry located in the first block).

26. As to claims 19, 21 and 22, Jennings and Baskins disclose the invention substantially as in parent claims 18 and 20, including, wherein determining whether the

trie entry of the first trie block indicates that the trie-entry portion is stored in the pruned-trie entry comprises determining whether a bit is set to indicate that the trie-entry portion is stored in the pruned-trie entry (Jennings, page.4, lines 10-14, where it can be an obvious variation to set a pointer to point to first block or second block).

27. As to claim 20, Jennings and Baskins disclose the invention substantially as in parent claim 16, including, wherein the pruned-trie entry is located in the second trie block (Baskins, [0022, lines 10-18], where, pointer information contains the address of the next level, this pointer information could be the third portion of data which has the information of the next level/block, where as this third portion is still residing in the second trie block).

28. As to claim 22, Jennings and Baskins disclose the invention substantially as in parent claim 20, including, determining whether a pointer is set to point to the pruned-trie entry of the second trie block (Jennings, page.4, lines 10-14).

29. As to claims 23, 34 and 40, Jennings and Baskins disclose the invention substantially as in parent claims 16, 32 and 38, including, further comprising determining from the pruned-trie entry the position the trie-entry portion occupies in the prefix (Baskins, Fig.6c, where pointer has the exact location of the pruned-trie entry, [0022, lines 13-16, where pointer in the pruned-trie entry contains the position information).

30. As to claim 24, Jennings and Baskins disclose the invention substantially as in parent claims 23, including, wherein determining the position the trie-entry portion occupies in the prefix comprises examining an indication of a range of bit positions of the trie-entry portion in the prefix (Jennings, Fig.3, page.6, lines 6-15 where number of bits are used to determine entry points or fields).

31. As to claim 25, Jennings and Baskins disclose the invention substantially as in parent claim 23, including, wherein determining the position the trie-entry portion occupies in the prefix comprises examining a mask indicating bit positions of the trie-entry portion in the prefix (Baskins, [0022, lines 13-15, where index digits can be interpret as mask).

32. As to claim 26, Jennings and Baskins disclose the invention substantially as in parent claim 16, including, further comprising identifying, if the trie-entry portion fails to match the second portion of the address, the next hop address indicated by the trie entry of the first trie block (Jennings, page.2, lines 20-21, where identifying another trie block is next hop address).

33. As to claim 27, is rejected for same rationale as claim 16 above, further Baskins discloses, if the trie entry of first trie block fails to indicate that next hop address in pruned-trie entry (Baskins, [0038, lines 33-49], where because of incomplete compression search detects void pointer returns which is failing incident for not finding next hop address in that trie entry and the trie entry can be a pruned trie entry.

Examiner's Note: Examiner has cited particular columns and line numbers in the references, as applied to the claims above for the convenience of the applicant.

Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in its entirety as potentially teaching of all or part of the claimed invention, as well as the context.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tauqir Hussain whose telephone number is 571-270-1247. The examiner can normally be reached on 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bunjob Jaroenchonwanit can be reached on 571 272 3913. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TH



BUNJOB JAROENCHONWANIT
SUPERVISORY PATENT EXAMINER

10/9/7